

Amino acids and proteins

- * proteins → Greek word (proteios) → First
- * Proteins can contain 100 or even 1000 of amino acids

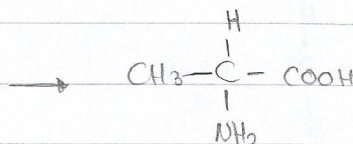
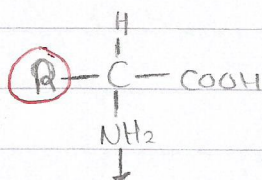
* What is amino acids?



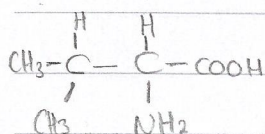
It must contain an amino function & a carboxylic acid function.

* The first amino acid is Glycine → amino acetic acid "Gly-G₁"
"H₂N-CH₂-COOH"

(1)



alanine or Ala-A or n-methyl glycine (2)

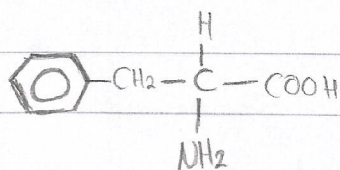


Valine or Val → essential amino acid

(3)

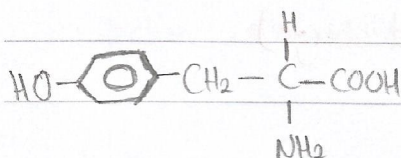
* Human body contains 22 amino acids, 8-9 are essential amino acids

* Human body can't produce in sufficient amount
can't be synthesised by human body > essential amino acids



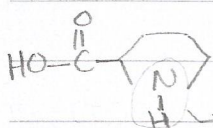
phenyl alanine or Phe → essential amino acid

(4)



Tyrosine or Tyr

(5)

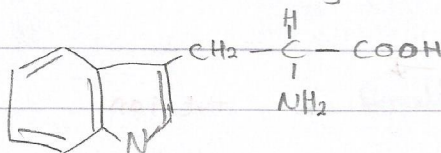


proline or Pro

→ very important amino acids, toxins for snakes

(6)

included in cyclic structure

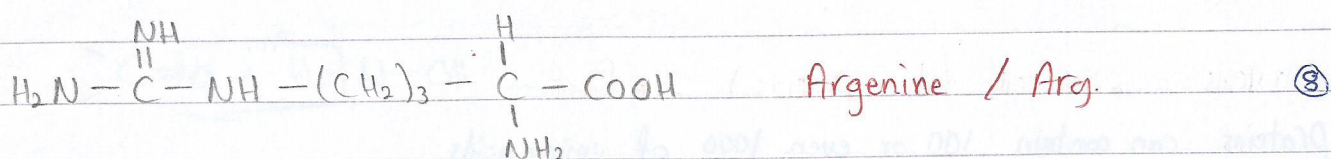


Tryptophan

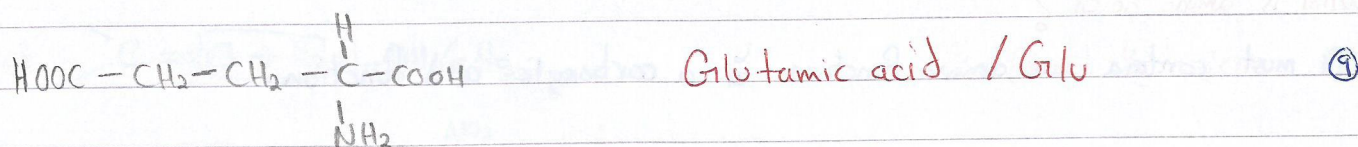
→ essential amino acid

(7)

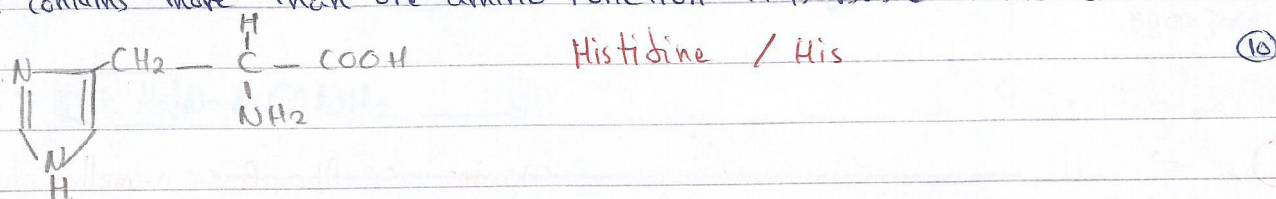
* If it contains more than one amino function it is Basic amino acid ^(NP)



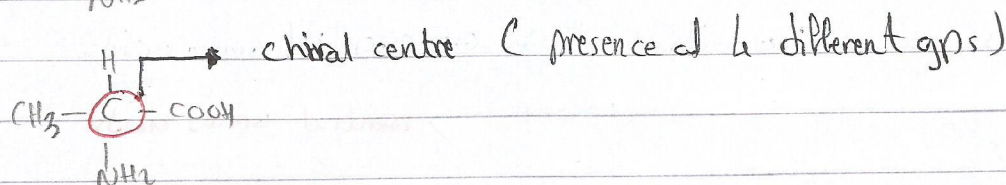
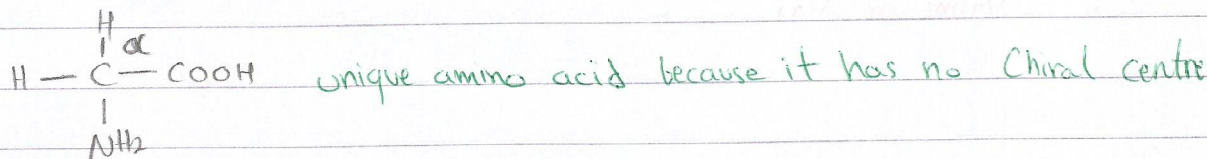
* If it contains more than one carboxylic acid it is acidic Amino acid



* If it contains more than one amino function it is Basic amino acid

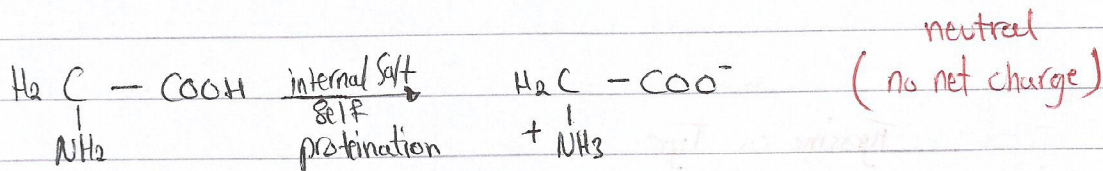


* All amino acid in human body are α -amino acid



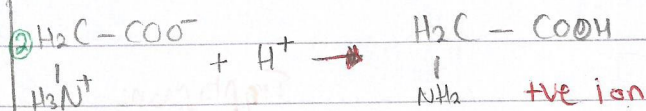
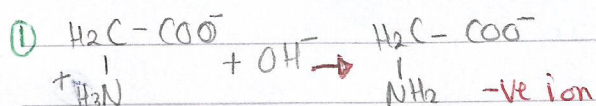
Synthesis

→ Formation of Zwitterion (Dipolar ion)



→ Solutions of amino acid in water are neutral to litmus paper

Amphoteric (reacts with acids and bases)

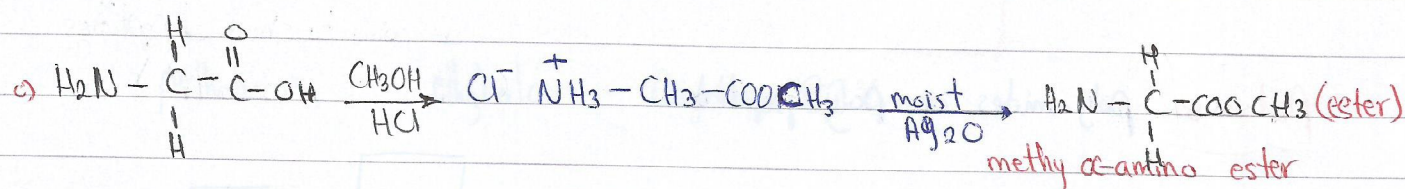
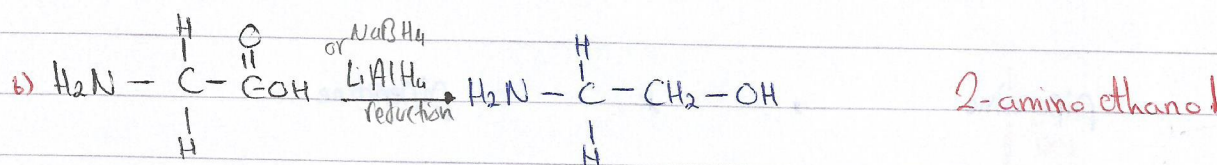
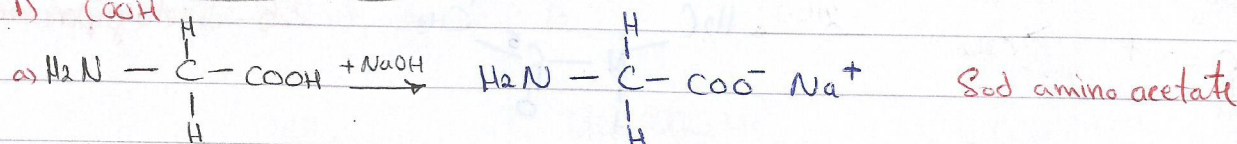


Glycine Zwitterion

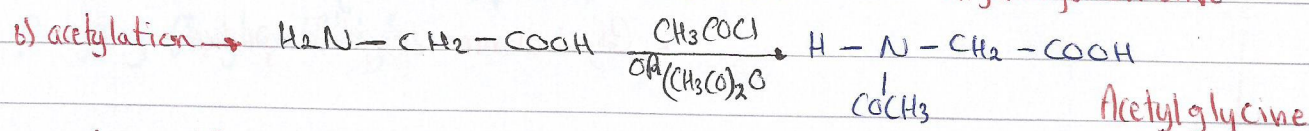
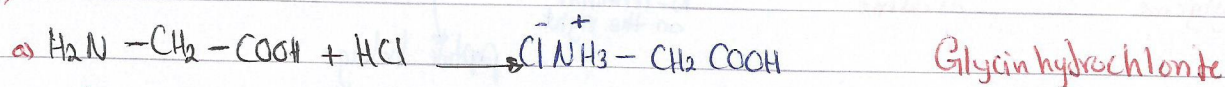
- * Isoelectric point is when pH at which amino acids exist totally as Zwitter ion
- * Electrophoresis is a technique used for identification and separation of amino acids at different pH in an electric field.
- * Amino acids are solid crystalline compounds soluble in water and all polar solvents and insoluble in non-polar solvents.
- * It melts at high temperature with decomposition.

Chemical Reactions

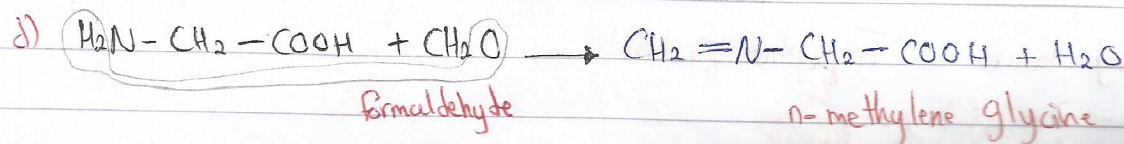
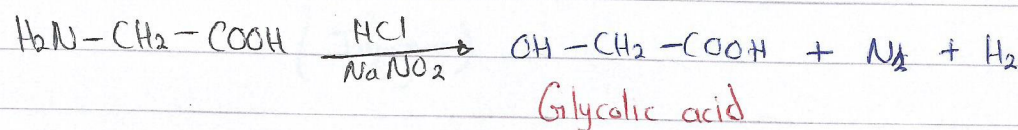
1) COOH

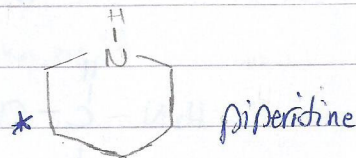
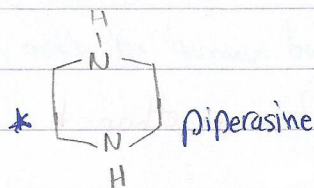
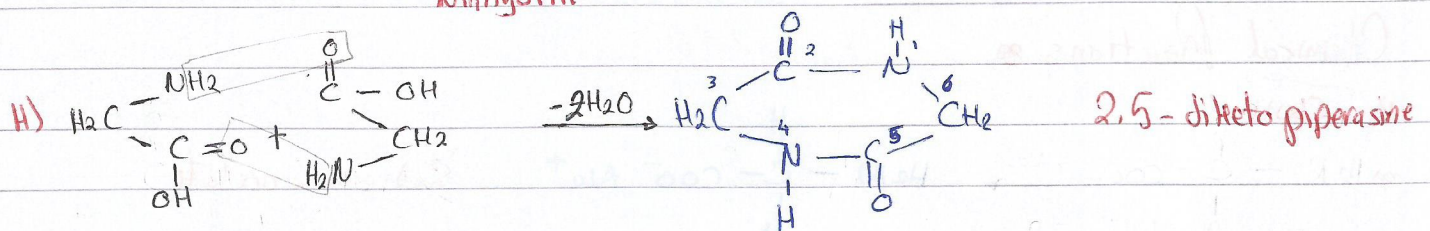
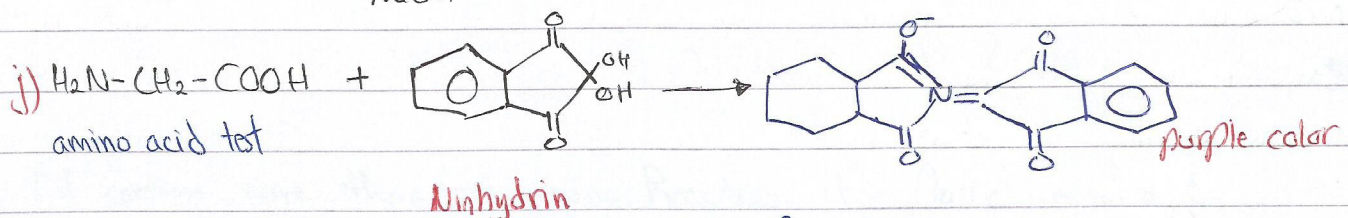
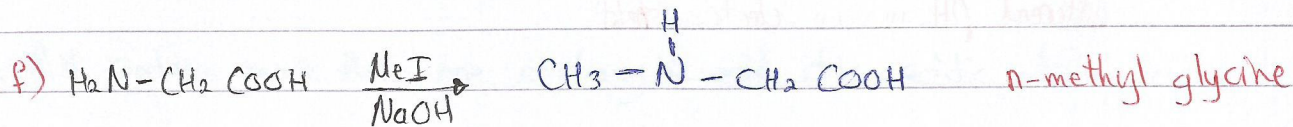
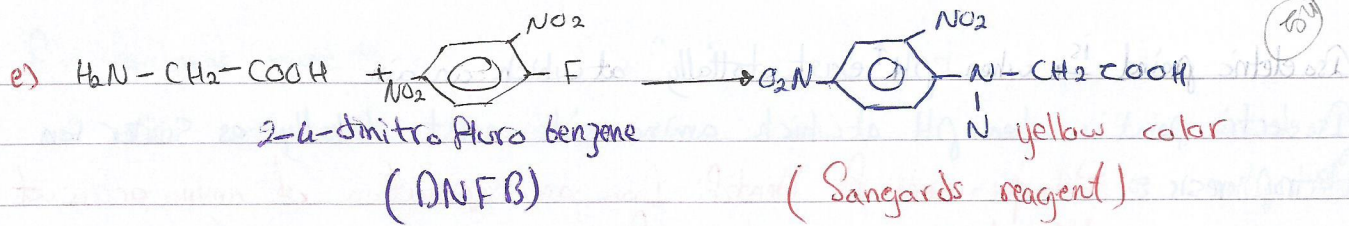


2) NH₂



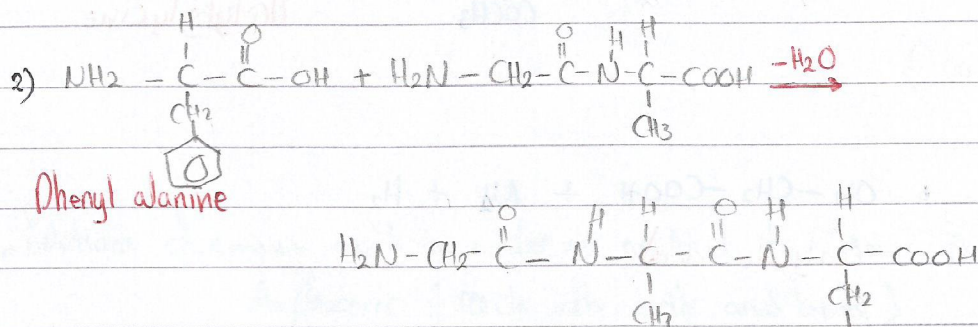
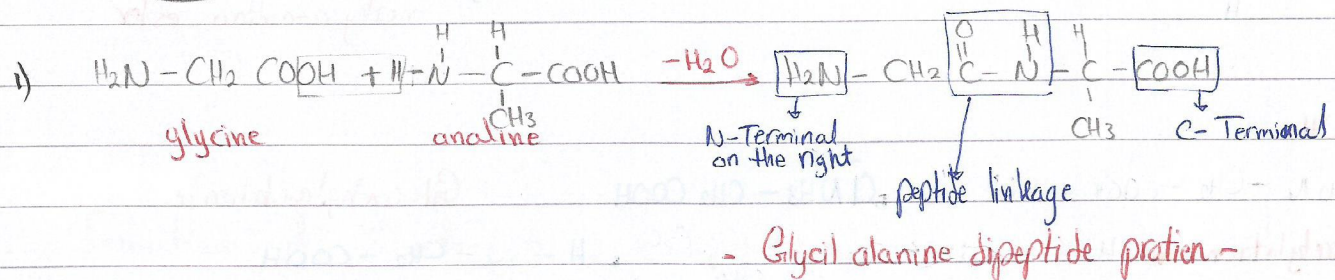
c) reaction with HNO₂





Proteins are poly amides or poly peptides

according to chain of peptides ($1^\circ, 2^\circ, 3^\circ, 4^\circ$)



Glycyl alanylglycyl phenyl alanine Tripeptide protein

poly peptides $\rightarrow$ more than 10 amino acids

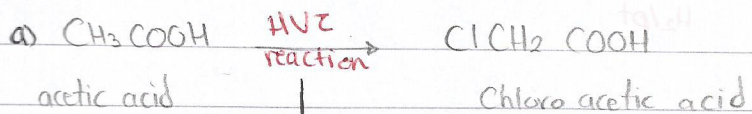
Tetrapeptide $\rightarrow$ 4 amino acid

oligopeptide $\rightarrow$ 10 amino acid

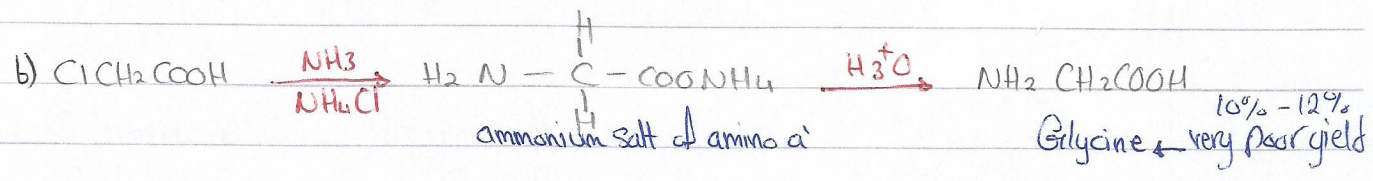
Synthesis of amino acids

1) Ammonolysis of α-haloacids

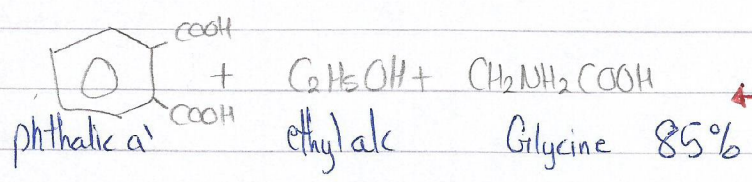
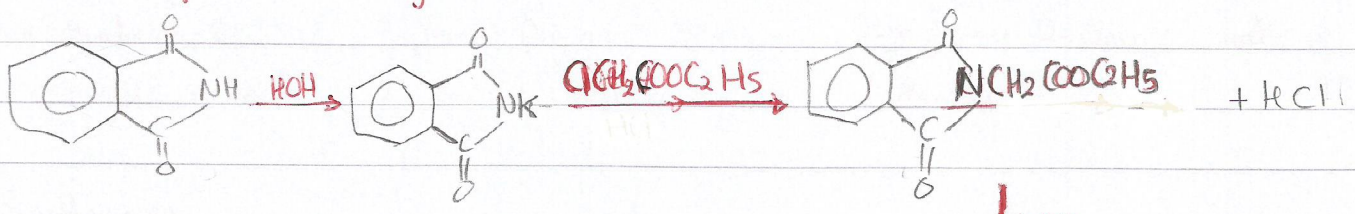
DL α-acids



Hell Volhard Zelinsky reaction (Cl_2/P)

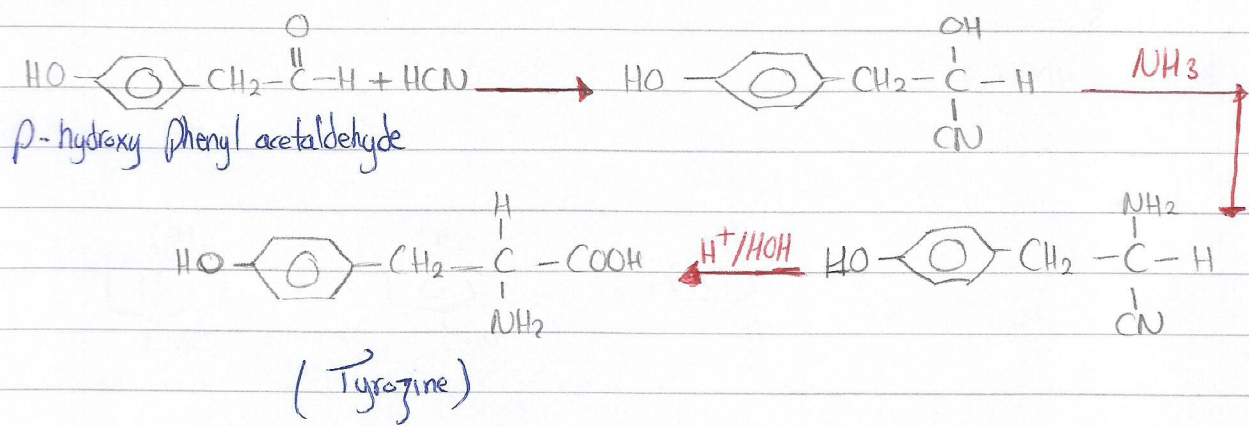


2) Gabriel phthalimide synthesis



3) Strecker Synthesis

starting material is aldehyde



4) Leop synthesis

starting material is keto acid

